

PROPOSED BASIN PLAN AMENDMENT

This proposed Basin Plan Amendment consists of two changes to the existing Basin Plan. The first change would insert the following text in its entirety into Chapter 4, immediately after the introduction of the section entitled “TOXIC POLLUTANT MANAGEMENT IN THE LARGER SAN FRANCISCO BAY ESTUARY SYSTEM.” Because this text would be added in its entirety, it is not shown below in redline/strikeout. A redline/strikeout version of the proposed amendment is available at the Water Board’s web site, www.swrcb.ca.gov/rwqcb2/sfbaymercurytml.htm. The second change (found on the last page of this appendix) modifies the existing Basin Plan text relating to continuing planning. It is shown in redline/strikeout here and in the version available from the Water Board’s web site.

San Francisco Bay Mercury TMDL

The following sections establish the allowable annual mercury load (Total Maximum Daily Load [TMDL]) to San Francisco Bay, and actions and monitoring necessary to implement the TMDL. The numeric targets, allocations, and associated implementation plan will ensure that all San Francisco Bay segments attain applicable water quality standards established to protect and support beneficial uses.

The TMDL allocations and implementation plan focus on controlling the amount of mercury that reaches the Bay and identifying and implementing actions to minimize mercury bioavailability. The organic form of mercury (methylmercury) is toxic and bioavailable, but information on ways of controlling methylmercury production is limited. However, this is an area of active research and strategies for controlling this process are forthcoming. The effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed and the TMDL may be adapted as warranted.

Problem Statement

San Francisco Bay is impaired because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. Mercury concentrations in San Francisco Bay fish are high enough to threaten the health of humans who consume them. In addition, mercury concentrations in some bird eggs harvested from the shores of San Francisco Bay are high enough to account for abnormally high rates of eggs failing to hatch.

In the context of this TMDL, “San Francisco Bay” refers to the following water bodies:

- Sacramento/San Joaquin River Delta (within San Francisco Bay region)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- Central San Francisco Bay
- Lower San Francisco Bay
- South San Francisco Bay (including the Lower South Bay)

This TMDL also addresses the following mercury-impaired water bodies that exist within the water bodies listed above:

- Castro Cove (part of San Pablo Bay)
- Oakland Inner Harbor (part of Central San Francisco Bay)
- San Leandro Bay (part of Central San Francisco Bay)

Numeric Targets

TMDL numeric targets interpret narrative and/or numeric water quality standards, including beneficial uses and water quality objectives. To protect sport fishing and human health, the fish tissue mercury concentration for typically consumed fish shall not exceed 0.2 mg mercury per kg fish tissue (wet weight). To protect wildlife and rare and endangered species, the concentration of mercury in bird eggs shall be less than 0.5 mg mercury per kg wet weight. The goal of this target is that controllable water quality factors not cause detrimental mercury concentrations in San Francisco Bay bird eggs, which is consistent with the bioaccumulation objective in Chapter 3. To achieve the fish tissue and bird egg targets and to attain water quality standards, the Baywide concentration of mercury in suspended sediment shall not exceed 0.2 mg mercury per kg dry sediment.

The Regional Monitoring Program (RMP) conducts monitoring relevant to evaluating progress toward meeting the sediment and fish tissue targets, and the U.S. Fish and Wildlife Service collects information on bird egg mercury concentrations useful to evaluate progress toward meeting the bird egg target. The following passages describe acceptable approaches to evaluate progress toward meeting the targets. Other approaches can be considered during adaptive implementation reviews.

Suspended Sediment Target

The suspended sediment target shall be compared to the annual median Bay suspended sediment mercury concentration found through RMP monitoring. The suspended sediment mercury concentration shall be computed as the difference between total and dissolved mercury concentration in a water sample (at each location) divided by the suspended sediment concentration for that same sample.

Human Health Target

The human health target is a fish tissue mercury concentration. The RMP conducts fish tissue sampling and analysis in San Francisco Bay every three years. Progress toward attainment of the human health target shall be evaluated by tracking mercury concentrations in striped bass, a frequently consumed sport fish with relatively high mercury concentrations. Striped bass are routinely caught in three size ranges: 45-59 cm (small), 60-82 cm (medium), and larger than 82 cm (large). To provide sufficient data to evaluate the target, striped bass in the small and medium size ranges should be caught and analyzed. The best functional relationship between mercury concentration and length shall be established for the fish caught, and the resulting equation of fit shall be evaluated at 60 cm to compute the mercury concentration to compare to the human health target. The RMP tracks mercury concentrations in other San Francisco Bay sportfish, such as halibut and jack smelt. This information will be used to assess overall trends and human health risks.

Wildlife Target

The wildlife target is expressed as a bird egg mercury concentration. The RMP is collaborating with the U.S. Fish and Wildlife Service on long-term monitoring and analysis of bird eggs. Eggs will be collected at several locations throughout San Francisco Bay. The wildlife target will be compared to the computed 99th percentile mercury concentration in eggs.

In addition to measuring mercury concentrations in bird eggs directly, it is also useful to measure the amount of mercury in bird prey. The Water Board will work with the RMP to develop a long term monitoring program to evaluate mercury concentrations in prey typically consumed by birds. Prey species should include benthic invertebrates and small fish that are typically consumed by piscivorous birds. According to the U.S. Fish and Wildlife Service, the sensitive and endangered California least tern will be protected if the average mercury concentration in the fish it consumes does not exceed 0.03 mg per kg fish tissue (wet weight). Achieving this prey fish concentration is an alternative method of demonstrating attainment of the wildlife target.

Sources and Losses

During the California Gold Rush, cinnabar mines in the Central Coast Ranges produced the mercury used to extract gold from the Sierra Nevada foothills. Mercury was later mined and used to produce munitions, electronics, and health care and commercial products.

The year 2003 estimate of total mercury inputs to the San Francisco Bay is about 1220 kg/yr. The sources of mercury in San Francisco Bay include bed erosion (about 460 kg/yr), the Central Valley watershed (about 440 kg/yr), urban stormwater runoff (about 160 kg/yr), the Guadalupe River watershed (about 92 kg/yr), direct atmospheric deposition (about 27 kg/yr), non-urban stormwater runoff (about 25 kg/yr), and wastewater discharges (about 16 kg/yr). There is a potential that mercury may enter the Bay from Bay margin contaminated sites and abandoned mercury mines outside the

Guadalupe watershed. An evaluation of these potential sources is addressed below under Mercury TMDL Implementation.

Using box models for sediment and mercury inputs and outputs to and from San Francisco Bay, the 2003 estimate for San Francisco Bay mercury losses is approximately 1700 kg/yr. Mercury leaves the Bay by transport to the Pacific Ocean via the Golden Gate, the net result of dredging and disposal (in-Bay and upland), and other losses.

Allocations

Tables 4-v through 4-z present load and wasteload allocations for San Francisco Bay mercury sources. Table 4-v presents load and wasteload allocations by source category and the 2003 estimated annual loads. Tables 4-w through 4-z contain wasteload allocations for individual wastewater and urban stormwater discharges to San Francisco Bay. When summed, the individual allocations equal the category totals for urban stormwater and wastewater shown in Table 4-v.

TABLE 4-v: Mercury Load and Wasteload Allocations By Source Category

<u>Source</u>	<u>2003 Mercury Load (kg/yr)</u>	<u>Allocation (kg/yr)</u>
<u>Bed Erosion^a</u>	<u>460</u>	<u>220</u>
<u>Central Valley Watershed</u>	<u>440</u>	<u>330</u>
<u>Urban Stormwater Runoff</u>	<u>160</u>	<u>82</u>
<u>Guadalupe River Watershed (mining legacy)</u>	<u>92^b</u>	<u>2</u>
<u>Atmospheric Deposition</u>	<u>27</u>	<u>27</u>
<u>Non-Urban Stormwater Runoff</u>	<u>25</u>	<u>25</u>
<u>Wastewater (municipal and industrial)</u>	<u>16</u>	<u>16</u>
<u>Sediment Dredging and Disposal^c</u>	<u>net loss</u>	<u>≤ ambient concentration</u>

^a Bed erosion occurs as mercury buried in Bay sediment becomes available for biological uptake when overlying sediment erodes.

^b This load does not account for mercury captured in ongoing sediment removal programs conducted in the watershed.

^c Sediment dredging and disposal often moves mercury-containing sediment from one part of the Bay to another. The dredged sediment mercury concentration generally reflects ambient conditions in San Francisco Bay sediment. This allocation is concentration-based. The mercury concentration of dredged material disposed in the Bay must be at or below the Baywide ambient mercury concentration. This allocation ensures that this source category continues to represent a net loss of mercury.

Total Maximum Daily Load

The mercury TMDL for San Francisco Bay is the sum of the load and wasteload allocations, 702 kg/yr. The Bay will attain applicable water quality standards for mercury when the overall mercury load is reduced to the TMDL and mercury methylation control measures are implemented.

A TMDL must include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality. This TMDL's targets and allocations rely on conservative assumptions, which thereby

TABLE 4-w: Wasteload Allocations for Urban Stormwater Discharges

<u>Entity</u>	<u>NPDES Permit</u>	<u>Allocation (kg/yr)^a</u>	<u>Load Reduction (kg/yr)^b</u>
<u>Santa Clara Valley Urban Runoff Pollution Prevention Program</u>	<u>CAS029718</u>	<u>23</u>	<u>21</u>
<u>Alameda Countywide Clean Water Program</u>	<u>CAS029831</u>	<u>20</u>	<u>19</u>
<u>Contra Costa Clean Water Program</u>	<u>CAS029912</u>	<u>11</u>	<u>11</u>
<u>San Mateo County Stormwater Pollution Prevention Program</u>	<u>CAS029921</u>	<u>8.4</u>	<u>8.0</u>
<u>Vallejo Sanitation and Flood Control District</u>	<u>CAS612006</u>	<u>1.6</u>	<u>1.6</u>
<u>Fairfield-Suisun Urban Runoff Management Program</u>	<u>CAS612005</u>	<u>1.6</u>	<u>1.5</u>
<u>American Canyon</u>	<u>CAS612007</u>	<u>0.14</u>	<u>0.13</u>
<u>Sonoma County area ^c</u>	<u>CAS000004</u>	<u>1.6</u>	<u>1.5</u>
<u>Napa County area ^c</u>	<u>CAS000004</u>	<u>1.6</u>	<u>1.5</u>
<u>Marin County area ^c</u>	<u>CAS000004</u>	<u>3.3</u>	<u>3.2</u>
<u>Solano County area ^c</u>	<u>CAS000004</u>	<u>0.81</u>	<u>0.77</u>
<u>San Francisco County area ^{c,d}</u>	<u>CAS000004</u>	<u>8.8</u>	<u>8.4</u>
<u>Total</u>		<u>82^c</u>	<u>78^c</u>

^a Allocations implicitly include all current and future permitted discharges within the jurisdictions of municipalities and unincorporated areas including, but not limited to, Caltrans facilities and rights-of-way, public facilities, industrial facilities, and construction sites.

^b This column contains calculated load reductions relative to the estimated 2003 urban stormwater runoff annual load that are consistent with attaining the wasteload allocation. Demonstration of such load reductions is an alternative manner of showing compliance with the allocations.

^c Includes unincorporated areas and all municipalities in the county that are in the Region and drain to the Bay. The statewide municipal stormwater general permit issued by the State Water Resources Control Board covers these municipalities.

^d This urban stormwater runoff load estimate does not account for treatment provided by San Francisco's combined sewer system. This treatment will be credited toward meeting the allocation and load reduction. This allocation includes Bayside CSO (CA0038610) and Northpoint CSO (CA0037672).

^e These totals differ slightly from the column sum due to rounding.

provide an implicit margin of safety. The adaptive approach to implementation provides an additional margin of safety.

Federal regulations also require TMDLs to account for seasonal variations and critical conditions. Mercury contamination in San Francisco Bay does not appear to be worse at any particular time of year. Therefore, concern about seasonal variability is not critical to this TMDL, and the allocation scheme does not have a seasonal component.

Mercury TMDL Implementation

The San Francisco Bay mercury TMDL implementation plan has four objectives: (1) reduce mercury loads to achieve load and wasteload allocations, (2) reduce methylmercury production, (3) conduct monitoring and focused studies to track progress and improve the scientific understanding of the system, and (4) encourage actions that address multiple pollutants. The plan establishes requirements for dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it addresses potential mercury sources and

**TABLE 4-x: Wasteload Allocations for
Individual Municipal Wastewater Discharges**

<u>Permitted Entity</u>	<u>NPDES Permit</u>	<u>Allocation (kg/yr)</u>
<u>American Canyon, City of</u>	<u>CA0038768</u>	<u>0.10</u>
<u>California Department of Parks and Recreation, Angel Island State Park</u>	<u>CA0037401</u>	<u>0.013</u>
<u>Benicia, City of</u>	<u>CA0038091</u>	<u>0.072</u>
<u>Burlingame, City of</u>	<u>CA0037788</u>	<u>0.069</u>
<u>Calistoga, City of</u>	<u>CA0037966</u>	<u>0.013</u>
<u>Central Contra Costa Sanitary District</u>	<u>CA0037648</u>	<u>1.97</u>
<u>Central Marin Sanitation Agency</u>	<u>CA0038628</u>	<u>0.13</u>
<u>Delta Diablo Sanitation District</u>	<u>CA0038547</u>	<u>0.25</u>
<u>Dublin-San Ramon Services District</u>	<u>CA0037613</u>	<u>0.52</u>
<u>East Bay Dischargers Authority</u>	<u>CA0037869</u>	<u>2.56^a</u>
<u>East Bay Municipal Utilities District</u>	<u>CA0037702</u>	<u>2.18</u>
<u>Fairfield-Suisun Sewer District</u>	<u>CA0038024</u>	<u>0.14</u>
<u>Las Gallinas Valley Sanitary District</u>	<u>CA0037851</u>	<u>0.16</u>
<u>Livermore, City of</u>	<u>CA0038008</u>	<u>0.090</u>
<u>Marin County Sanitary District, Paradise Cove</u>	<u>CA0037427</u>	<u>0.001</u>
<u>Marin County Sanitary District, Tiburon</u>	<u>CA0037753</u>	<u>0.007</u>
<u>Millbrae, City of</u>	<u>CA0037532</u>	<u>0.042</u>
<u>Mountain View Sanitary District</u>	<u>CA0037770</u>	<u>0.024</u>
<u>Napa Sanitation District</u>	<u>CA0037575</u>	<u>0.24</u>
<u>Novato Sanitary District</u>	<u>CA0037958</u>	<u>0.075</u>
<u>Palo Alto, City of</u>	<u>CA0037834</u>	<u>0.26</u>
<u>Petaluma, City of</u>	<u>CA0037810</u>	<u>0.048</u>
<u>Pinole, City of</u>	<u>CA0037796</u>	<u>0.042</u>
<u>Contra Costa County, Port Costa Wastewater Treatment Plant</u>	<u>CA0037885</u>	<u>0.001</u>
<u>Rodeo Sanitary District</u>	<u>CA0037826</u>	<u>0.055</u>
<u>Saint Helena, City of</u>	<u>CA0038016</u>	<u>0.045</u>
<u>San Francisco, City and County of, San Francisco International Airport WQCP</u>	<u>CA0038318</u>	<u>0.028</u>
<u>San Francisco, City and County of, Southeast Plant</u>	<u>CA0037664</u>	<u>2.27</u>
<u>San Jose/Santa Clara WPCP</u>	<u>CA0037842</u>	<u>0.49</u>
<u>San Mateo, City of</u>	<u>CA0037541</u>	<u>0.26</u>
<u>Sausalito-Marín City Sanitary District</u>	<u>CA0038067</u>	<u>0.068</u>
<u>Seafirth Estates</u>	<u>CA0038893</u>	<u>0.001</u>
<u>Sewerage Agency of Southern Marin</u>	<u>CA0037711</u>	<u>0.11</u>
<u>Sonoma Valley County Sanitary District</u>	<u>CA0037800</u>	<u>0.030</u>
<u>South Bayside System Authority</u>	<u>CA0038369</u>	<u>0.44</u>
<u>South San Francisco/San Bruno WQCP</u>	<u>CA0038130</u>	<u>0.24</u>
<u>Sunnyvale, City of</u>	<u>CA0037621</u>	<u>0.083</u>
<u>US Naval Support Activity, Treasure Island WWTP</u>	<u>CA0110116</u>	<u>0.023</u>
<u>Union Sanitary District, Wet Weather</u>	<u>CA0038733</u>	<u>0.001</u>
<u>Vallejo Sanitation & Flood Control District</u>	<u>CA0037699</u>	<u>0.49</u>
<u>West County Agency, Combined Outfall</u>	<u>CA0038539</u>	<u>0.32^c</u>
<u>Yountville, Town of</u>	<u>CA0038121</u>	<u>0.038</u>
<u>Total</u>		<u>14^b</u>

^a This allocation includes wastewater treatment and all wet weather facilities.

^b Total differs slightly from the column sum due to rounding.

^c Mercury monitoring data quality concerns pertaining to this discharger will need to be addressed during the next review.

**TABLE 4-y: Wasteload Allocations for
Individual Petroleum Refinery Wastewater Discharges**

<u>Permitted Entity</u>	<u>NPDES Permit</u>	<u>Allocation (kg/yr)</u>
<u>Chevron Products Company</u>	<u>CA0005134</u>	<u>0.40</u>
<u>ConocoPhillips</u>	<u>CA0005053</u>	<u>0.15</u>
<u>Martinez Refining Co. (formerly Shell)</u>	<u>CA0005789</u>	<u>0.25</u>
<u>Ultramar, Golden Eagle</u>	<u>CA0004961</u>	<u>0.12</u>
<u>Valero Refining Company</u>	<u>CA0005550</u>	<u>0.080</u>
<u>Total</u>		<u>1.0</u>

**TABLE 4-z: Wasteload Allocations for
Individual Industrial (Non-Petroleum Refinery) Wastewater Discharges**

<u>Permitted Entity</u>	<u>NPDES Permit</u>	<u>Allocation (kg/yr)</u>
<u>C&H Sugar Co.</u>	<u>CA0005240</u>	<u>0.003</u>
<u>Crockett Cogeneration</u>	<u>CA0029904</u>	<u>0.011</u>
<u>The Dow Chemical Company</u>	<u>CA0004910</u>	<u>0.099</u>
<u>General Chemical</u>	<u>CA0004979</u>	<u>0.51^a</u>
<u>GWF Power Systems, Site I</u>	<u>CA0029106</u>	<u>0.004</u>
<u>GWF Power Systems, Site V</u>	<u>CA0029122</u>	<u>0.006</u>
<u>Hanson Aggregates, Amador Street</u>	<u>CA0030139</u>	<u>0.001</u>
<u>Hanson Aggregates, Olin Jones Dredge Spoils Disposal</u>	<u>CA0028321</u>	<u>0.001</u>
<u>Hanson Aggregates, Tidewater Ave. Oakland</u>	<u>CAA030147</u>	<u>0.001</u>
<u>Pacific Gas and Electric, East Shell Pond</u>	<u>CA0030082</u>	<u>0.002</u>
<u>Pacific Gas and Electric, Hunters Point Power Plant</u>	<u>CA0005649</u>	<u>0.049</u>
<u>Rhodia, Inc.</u>	<u>CA0006165</u>	<u>0.027</u>
<u>San Francisco, City and Co., SF International Airport Industrial WTP</u>	<u>CA0028070</u>	<u>0.12</u>
<u>Southern Energy California, Pittsburg Power Plant</u>	<u>CA0004880</u>	<u>0.019</u>
<u>Southern Energy Delta LLC, Potrero Power Plant</u>	<u>CA0005657</u>	<u>0.008</u>
<u>United States Navy, Point Molate</u>	<u>CA0030074</u>	<u>0.030</u>
<u>USS-Posco</u>	<u>CA0005002</u>	<u>0.11</u>
<u>Total</u>		<u>1.0^b</u>

^a Data quality concerns pertaining to this discharger will need to be addressed during the next review.

^b Total differs slightly from the column sum due to rounding.

describes actions necessary to manage risks to Bay fish consumers. The adaptive implementation section describes the method and schedule for evaluating and adapting the TMDL and implementation plan as needed to assure water quality standards are attained.

Mercury Source Control Actions

This section, organized by mercury source categories, specifies actions required to achieve allocations and implement the TMDL.

Central Valley Watershed

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) is developing mercury TMDLs for several mercury-impaired water bodies in its region that drain to San Francisco Bay. The Central Valley Water Board staff is currently developing a mercury TMDL for portions of the Delta within the Central Valley region designed to meet the Central Valley watershed's load allocation. This Delta mercury TMDL is scheduled for consideration as a Basin Plan Amendment by the Central Valley Water Board by December 2005.

Attainment of the load allocation shall be assessed as a five-year average annual mercury load by one of two methods. First, attainment may be demonstrated by documentation provided by the Central Valley Water Board that shows a net 110 kg/yr decrease in total mercury entering the Delta from within the Central Valley region. Alternatively, attainment of the load allocation may be demonstrated by multiplying the flow-weighted suspended sediment mercury concentration by the sediment load measured at the RMP Mallard Island monitoring station. If sediment load estimates are unavailable, the load shall be assumed to be 1,600 million kg of sediment per year. The mercury load fluxing past Mallard Island will be less than or equal to 330 kg/yr after attainment of the allocation.

The allocation for the Central Valley watershed should be achieved within 20 years after the Central Valley Water Board begins implementing its TMDL load reduction program. Studies need to be conducted to evaluate the time lag between the remediation of mercury sources and resulting load reductions from the Delta. An interim loading milestone of 385 kg/yr of mercury, halfway between the current load and the allocation, should be attained ten years after implementation of the Central Valley Delta TMDL begins. This schedule will be reevaluated as the load reduction plans are implemented.

Urban Stormwater Runoff

The wasteload allocations shown in Table 4-w shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and the California Department of Transportation (Caltrans). The permits shall require the implementation of best management practices designed to achieve the wasteload allocations or accomplish the load reductions derived from the wasteload allocations. The allocation for this group shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, shall be achieved within ten years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving it.

The following requirements are or shall be incorporated into NPDES permits issued by the Water Board for urban stormwater discharges. Similar requirements will be applied

to municipalities covered by the statewide municipal stormwater general permit (issued by the State Water Resources Control Board) five years after the effective date of this Mercury TMDL implementation plan.

- i) Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;
- ii) Develop and implement a mercury source control program;
- iii) Develop and implement a monitoring system to quantify either mercury loads or loads avoided through treatment, source control, and other management efforts;
- iv) Conduct studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;
- v) Develop an equitable allocation-sharing scheme in cooperation with Caltrans (see below) to address Caltrans facilities in the program area, and report the details of the agreement to the Water Board;
- vi) Prepare an annual report that documents compliance with the above requirements and documents either mercury loads or loads avoided through ongoing pollution prevention and control activities; and
- vii) Demonstrate compliance with allocations shown in Table 4-w using one of the following methods:
 - Quantify the annual average mercury load avoided by implementing pollution prevention, source control, and treatment efforts. The Water Board may recognize loads avoided resulting from activities implemented after 2001 as counting toward the load reductions consistent with the wasteload allocation.
 - Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.
 - Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

Each urban stormwater discharger allocation implicitly includes all current and future permitted discharges within the jurisdictions of municipalities and unincorporated areas including, but not limited to, Caltrans facilities and rights-of-way, public facilities, industrial facilities, and construction sites. Municipalities have a responsibility to oversee these sources. However, if it is determined that a source is substantially contributing to mercury loads to the Bay and is outside the jurisdiction or authority of a municipality, the Water Board will consider issuing an individual permit for that source.

Within the jurisdiction of each urban stormwater discharger, Caltrans is responsible for discharges associated with California highways and related facilities. The percentage of each urban stormwater discharger's mercury load for which Caltrans should be responsible and the reductions needed from Caltrans runoff have not been determined. Consequently, Caltrans shall be required to implement the following actions:

- i) Develop and implement a system to quantify mercury loads or loads avoided through control actions;
- ii) Prepare an annual report that documents mercury loads or loads avoided through control actions; and
- iii) Develop an equitable allocation-sharing scheme in cooperation with the urban stormwater dischargers, and report the details of the agreement to the Water Board.

Guadalupe River Watershed (Mining Legacy)

In the near term, the effort underway to develop the Guadalupe River Watershed Mercury TMDL will be the mechanism used to implement and track progress toward achieving the load allocation. Ultimately, the Water Board expects the implementation plan for the Guadalupe River Watershed Mercury TMDL to integrate implementation efforts relative to that TMDL with those implementation efforts for the San Francisco Bay Mercury TMDL.

Efforts are already underway in the watershed to reduce mercury loads, and more are planned. As the mercury load reductions resulting from these efforts are quantified by the dischargers identified through the Guadalupe River Watershed Mercury TMDL process, the Water Board will consider how the reductions achieved will be counted toward fulfillment of the load reductions required to meet the Guadalupe River watershed load allocation.

The Guadalupe River watershed mining legacy mercury load allocation is expected to be attained within 20 years after the Water Board begins implementing the Guadalupe River Watershed Mercury TMDL. As a way to measure progress, an interim loading milestone of 47 kg/yr of mercury, halfway between the current load and the allocation, shall be achieved within ten years. If the interim loading milestone is not achieved, dischargers shall make reasonable and measurable progress toward achieving the ten-year load reduction.

The dischargers identified through the Guadalupe River Watershed Mercury TMDL shall demonstrate compliance with their allocations using one of the methods listed below.

- 1. Quantify the annual average mercury load avoided by implementing pollution prevention, source control, and treatment efforts. The Water Board may recognize loads avoided resulting from activities implemented after 2001 as counting toward the load reductions consistent with the load allocation.
- 2. Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.
- 3. Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged from the watershed to San Francisco Bay is below the suspended sediment target.

Municipal Wastewater

The individual municipal wastewater wasteload allocations shall be implemented as a group mass limit. The Water Board will issue a San Francisco Bay watershed mercury NPDES permit to all dischargers listed in Table 4-x. The group mass limit is the sum of the individual allocations for these facilities, 14 kg/yr.

The group mass limit and the following requirements shall be incorporated into the watershed NPDES permit for municipal wastewater dischargers:

- Develop and implement effective mercury source control programs (the level of effort shall be commensurate with the mercury load of the facility);
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Track individual facility and aggregate wastewater loads and the status of source control and pollution prevention activities;
- Conduct studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;
- Conduct studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from all facilities, mercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through program activities unrelated to normal treatment. All wastewater dischargers shall be parties to a memorandum of understanding affirming their obligation to provide the necessary information for this annual report.

The NPDES watershed permit for municipal facilities shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that municipal wastewater facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation and an effluent mercury trigger concentration, it shall be required to submit a report that:

- Evaluates the cause of the trigger exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance.

Effluent mercury trigger concentrations for secondary treatment facilities are a daily maximum of 0.065 µg/l total mercury and monthly average of 0.041 µg/l total mercury. For advanced treatment facilities, effluent mercury trigger concentrations are a daily maximum of 0.021 µg/l total mercury and a monthly average of 0.011 µg/l total mercury.

Industrial Wastewater

The wasteload allocations for the industrial wastewater discharges from the five Bay Area petroleum refineries (Chevron, ConocoPhillips, Shell, Ultramar Golden Eagle, and Valero) shall be implemented as a group mass limit. The group mass limit is the sum of the individual allocations for these facilities, 1 kg/yr, as shown in Table 4-y. The wasteload allocations for all other industrial wastewater facilities listed in Table 4-z shall be implemented as individual mass limits.

Mass limits and the following requirements shall be incorporated into NPDES permits for all industrial wastewater dischargers:

- Develop and implement effective mercury source control programs (the level of effort will be commensurate with the mercury load of the facility);
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Conduct studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;
- Conduct studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from all facilities, mercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through program activities unrelated to normal treatment.

The NPDES permits for industrial facilities shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that industrial facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation and an effluent mercury trigger concentration, it shall be required to submit a report that:

- Evaluates the cause of the trigger exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance.

Effluent mercury trigger concentrations are a daily maximum of 0.062 µg/l total mercury and monthly average of 0.037 µg/l total mercury.

Requirements to investigate the fate of mercury in crude oil and report findings to the Water Board within five years of the effective date of this Mercury TMDL implementation plan shall be incorporated into petroleum refinery wastewater NPDES permits. The report shall address two key questions:

1. How much mercury is in crude oil processed in the Bay Area?
2. After the refining process, what is the environmental fate of the mercury originally contained in the crude oil?

Sediment Dredging and Disposal

The allocation for sediment dredging and disposal requires that the mercury concentration in dredged material disposed of in the Bay not exceed the Baywide ambient median suspended sediment mercury concentration from all RMP Bay monitoring stations. Prior to disposal, the material shall be sampled and analyzed according to the procedures outlined in the 2001 U.S. Army Corps of Engineers document “Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region.”

The process of dredging and disposing of dredged material in the Bay may enhance biological uptake and methylmercury exposure. To address this concern, permitted dredging and disposal operations shall demonstrate that their activities are accomplished in a manner that does not increase bioavailability of mercury. As part of this demonstration, the Waste Discharge Requirements for such operations shall include requirements to conduct studies to better understand how their operations affect mercury fate, transport, and biological uptake.

Atmospheric Deposition

Mercury that deposits directly on the Bay surface and the surrounding watershed is attributed to both remote and local sources. The extent to which these sources can be controlled is unknown and the Water Board’s authority to control such sources is limited. The load allocation does not require a reduction from this source category at this time. However, recent scientific studies suggest that mercury newly deposited from the atmosphere may be more available for biological uptake than mercury already present in an aquatic system. As such, the following implementation efforts need to be undertaken to evaluate the significance of atmospheric deposition and the feasibility of load reductions:

- The U.S. Environmental Protection Agency should investigate the significance of atmospheric deposition and actively pursue national and international efforts to reduce the amount of mercury released through combustion of fossil fuels; and
- The Bay Area Air Quality Management District should investigate the significance of local mercury air emissions and evaluate the effectiveness of existing potential control measures.

New Mercury Sources

As the TMDL is implemented, new sources of mercury may emerge either as the result of a new facility applying for a discharge permit or as a result of a new source being discovered. The Water Board will consider establishing a load or wasteload allocation for a new mercury source under any of the following circumstances:

- The allocation from one or more existing sources of the same category (e.g., municipal wastewater) will be reduced by an amount equal to the new allocation; or
- The Water Board finds that the magnitude of the new allocation is negligible compared to load reductions from all sources that will have been realized prior to establishing the new allocation; or
- The allocation is for a previously unquantified discharge of mercury from a source category that does not already have an allocation.

This section specifies actions required for sources that are potentially either discharging mercury or enhancing methylmercury production in the Bay.

Mercury Mines

Local inactive mercury mines shall be addressed through continued implementation of the Mines and Mineral Producers Discharge Control Program described later in this chapter. The key regulatory component of this established program is that property owners of inactive and active mine sites that discharge stormwater contaminated by contact with any overburden, raw material, intermediate products, finished products, byproducts, or waste products are required to comply with NPDES industrial stormwater regulations. Under the Discharge Control Program, the Water Board has the authority to issue individual industrial permits or allow the discharger to obtain coverage under the industrial stormwater general permit issued by the State Water Resources Control Board. For those mines that are not currently meeting the conditions set forth in the mines section of this chapter, responsible parties will be notified immediately that they shall attain compliance within five years of the effective date of this Mercury TMDL implementation plan.

Bay Margin Contaminated Sites

A number of former industrial and military sites that contain mercury-enriched sediment surround the Bay. Available data are insufficient at this time to determine whether these sites may be discharging to the Bay. While the load these sites contribute to the Bay may be small relative to known sources, these sites may pose local threats. As such, cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will require parties responsible for Bay margin contaminated sites to:

1. Quantify mercury mass on site such that the upper 95% confidence limit of the mean value is no more than 20% higher than the estimated mean;
2. Determine seasonal and spatial patterns of total mercury and methylmercury in sediments on site;
3. Estimate future mercury mass on site and patterns of contamination after planned remediation efforts are complete;
4. Determine seasonal patterns of total mercury and methylmercury in the water column at the site;
5. Collect prey items for local fish and birds and assess mercury concentrations; and
6. Quantify rate of sediment accretion or erosion at the site.

These requirements shall be incorporated into relevant site cleanup plans within five years of the effective date of this mercury TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL.

Wetlands

Wetlands may contribute substantially to methylmercury production and biological exposure to mercury within the Bay. Plans for extensive wetland restoration in the San Francisco Bay region raise the concern that mercury methylation may increase, thereby increasing the amount of mercury entering the food web. Implementation tasks related to wetlands focus on managing existing wetlands and ensuring that new constructed wetlands are designed to minimize methylmercury production and subsequent transfer to the food web.

The Water Board issues Waste Discharge Requirements and Clean Water Act Section 401 certifications that set forth conditions related to Bay filling and the construction and management of wetlands. To implement the mercury TMDL, the Waste Discharge Requirements and Section 401 certifications for wetland projects shall include provisions that the restored wetland region be designed and operated to minimize methylmercury production and biological uptake, and result in no net increase in mercury or methylmercury loads to the Bay. Additionally, projects must include pre- and post-restoration monitoring to demonstrate compliance. There is much active research on mercury cycling in wetlands. Information about how to manage wetlands to suppress or minimize mercury methylation will be adaptively incorporated into this implementation plan as it becomes available.

Risk Management

The mercury problem in San Francisco Bay may take decades to solve. However, there are activities that should be undertaken immediately to help manage the risk to consumers of mercury-contaminated fish. In this effort, the Water Board will work with the California Office of Environmental Health Hazard Assessment and the California Department of Health Services. The risk management activities will include the following:

- Providing fish-consumption advice to the public to help reduce methylmercury exposure;
- Regularly informing the public about monitoring data and findings regarding hazards of eating mercury-contaminated fish; and
- Performing special studies needed to support health risk assessment and risk communication.

Adaptive Implementation

Approximately every five years, the Water Board will review the San Francisco Bay Mercury TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. Any necessary modifications to the targets, allocations, or implementation

plan will be incorporated into the Basin Plan. At a minimum, the following focusing questions will be used to conduct the reviews. Additional focusing questions will be developed in collaboration with stakeholders during each review.

1. Is the Bay progressing toward TMDL targets as expected? If it is unclear whether there is progress, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
2. What are the loads for the various source categories, how have these loads changed over time, and how might source control measures be modified to improve load reduction?
3. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?

Using available data, the load and wasteload allocations were determined on the basis of their sufficiency to achieve water quality standards. As part of the adaptive implementation process, the Water Board will review the feasibility, effectiveness, and cost of actions to control mercury loads. The Water Board may consider in future Basin Plan amendments new evidence in determining whether to revise load and wasteload allocations as well as implementation requirements.

Load and wasteload allocations have been assigned to individual entities. However, assigning loads by watersheds could be a useful approach for managing pollutant loads, particularly if net environmental benefits can be realized. Such a program would only involve watersheds in the San Francisco Bay region that drain to the Bay. Such an approach could involve urban runoff management programs, wastewater facilities, and other dischargers in a watershed accepting joint responsibility for load reductions. An acceptable watershed allocation program may include incentives for agencies to implement load reduction activities and account for avoided mercury loads. Credits could be used to offset annual loads and attain allocations for multiple sources. The relative potential for mercury from different sources to enter the food web and the potential for local impacts will need to be considered. Until such a program is established, the Water Board will consider mercury control activities on a case-by-case basis to determine how they may result in reducing loads to the Bay.

The following changes, shown in redline/strikeout, apply to the section at the end of Chapter 4 entitled "CONTINUING PLANNING."

REGIONAL BOARD RESOURCE ALLOCATION

The items indicated below have been identified in this review as specific areas for which ~~Regional Board~~Water Board planning resources should be allocated. The items are divided into categories and each item is followed by an estimate of the frequency at which the item will be reviewed or the staff time and/or contract dollars needed to complete the item. Resolution of these items may result in future Basin Plan amendments.

<u>TOTAL MAXIMUM DAILY LOAD</u>	
<u>Review the San Francisco Bay Mercury TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. Determine if modifications to the targets, allocations, or implementation plan are necessary.</u>	<u>Every 5 years</u>